

FUTURE FISHERIES IMPROVEMENT PROGRAM GRANT APPLICATION

Please fill in the highlighted areas

*all sections (IA, IB, IC, etc.) must be addressed or the application will be considered invalid***I. APPLICANT INFORMATION**

- A. Applicant Name: Big Blackfoot Chapter of Trout Unlimited
- B. Mailing Address: PO Box 1
- C. City: Ovando State: MT Zip: 59854
- Telephone: 406-240-4824 E-mail: ryen@montanatu.org
- D. Contact Person: Ryen Neudecker
- Address if different from Applicant: See above
- City: State: Zip:
- Telephone: E-mail:
- E. Landowner and/or Lessee Name (if other than Applicant): Paul Roos
- Mailing Address: PO Box 5
- City: Lincoln State: MT Zip: 59639
- Telephone: 406-459-3648 E-mail: paul@paulroos.com

II. PROJECT INFORMATION*

- A. Project Name: Lincoln Spring Creek Restoration II
- River, stream, or lake: Lincoln Spring Creek
- Location: Township: 14N Range: 9W Section: 14
- Latitude: 112 42' 39" Longitude: 46 58' 17" N *within project (decimal degrees)*
- County: Lewis & Clark
- B. Purpose of Project:
- The goal of this project is to restore the instream, riparian and wetland functions of this spring creek to improve rearing, spawning and overall habitat conditions for native and non-native trout.
- C. Brief Project Description:
-

Lincoln Spring Creek Restoration

Lincoln Spring Creek is a first-order spring creek tributary to Keep Cool Creek and flows five miles exclusively through private land. Based on landowner accounts and recent FWP data, the stream supported populations of bull trout historically, and currently westslope cutthroat trout, brown trout and brook trout are present. The Lincoln Spring Creek habitat improvement project is located approximately 1 mile west of Lincoln Montana and builds upon a stream restoration project implemented in 2008 where over 9,000 feet of channel was restored by narrowing and deepening over-widened reaches, increasing sinuosity, reconnecting floodplains and improving fish passage conditions.

Past land use activities such as channel straightening and historic grazing pressures have left many areas of the Lincoln Spring Creek channel with high width/depth ratios resulting in fine sediment deposition in the channel margins and has cemented and infilled channel substrates. These fine sediments limit macroinvertebrate production and salmonid spawning areas throughout the reach. Many sections of the project area lack woody riparian habitat that provide shading for the stream and cover for the fishery. Sections of the stream do have some riffle and run features but due to over widening, the riffle, run, pools and glides are not functioning based on the reference reaches. A large reach of channel within the project reach has also been straightened and has down cut leaving the both the right and left banks higher than reference conditions.

The proposed project will restore 4,400 feet of Lincoln Spring Creek and 0.47 acres of emergent wetlands. Project goals include increasing habitat diversity for fish, waterfowl, and other wildlife, restoring a natural spring creek ecosystem, re-establishing stream and floodplain connectivity, and improving wetland structure and function.

Specific objectives include:

1. Restoring proper pattern, profile and dimensions to those reaches that have been straightened and not functioning.
2. Improving sediment transport conditions to help maintain cleaner substrate and provide better food production and increase spawning areas in Lincoln Spring Creek.
3. Installation of small, root mimicry structures to provide refugia, overhead cover and stability until the native shrub component and channel function are restored.
4. Narrow the over widened stream channel with finger bars to restore floodplain functions and emergent wetland values in the active floodplain.

D. Length of stream or size of lake that will be treated: 4,400 feet

E. Project Budget:

Grant Request (Dollars): \$ 10,000

Contribution by Applicant (Dollars): \$ 6,760 In-kind \$ 2,000
(salaries of government employees are not considered as matching contributions)

Contribution from other Sources (Dollars): \$ 11,250 In-kind \$ 60,900
(attach verification - See page 2 budget template)

Total Project Cost: \$ 90,910

Lincoln Spring Creek Restoration

- F. Attach itemized (line item) budget – see template

Attach **specific project plans, detailed sketches, plan views, photographs, maps, evidence of landowner consent, evidence of public support and fish biologist support, and/or other information necessary to evaluate the merits of the project. If project involves water leasing or water salvage complete a *supplemental questionnaire*** (fwp.mt.gov/habitat/futurefisheries/supplement2.doc).

- H. **Attach land management & maintenance plans that will ensure protection of the reclaimed area.**

III. PROJECT BENEFITS*

- A. What species of fish will benefit from this project?:

Brown trout and westslope cutthroat trout.

- B. How will the project protect or enhance wild fish habitat?:

The proposed reach along Lincoln Spring Creek lacks suitable habitat to support trout populations. By addressing improper channel dimensions and riparian function we anticipate a dramatic improvement in instream and riparian habitat conditions.

- C. Will the project improve fish populations and/or fishing? To what extent?:

We expect the project to improve fish populations within Lincoln Spring Creek. A similar project on Keep Cool Creek resulted in an increase in spawning redds.

- D. Will the project increase public fishing opportunity for wild fish and, if so, how?:

Lincoln Spring Creek feeds Keep Cool Creek which is a tributary to the upper Blackfoot River in a reach that has several access points for anglers. Restoration on tributaries that feed the river is the focus of our program in that tributaries are the lifeblood to the river as they provide the spawning habitat and majority of recruitment.

- E. The project agreement includes a 20-year maintenance commitment. Please discuss your ability to meet this commitment.

The landowner has signed a 20-year landowner agreement with the USFWS and BBCTU.

- F. What was the cause of habitat degradation in the area of this project and how will the project correct the cause?:

The channel was historically straightened and historic grazing pressure has caused the channel to become over-widened and accumulate fine sediment. We will address both issues with the treatments described in the design.

- G. What public benefits will be realized from this project?:

This project involves the continuation of the Blackfoot River Restoration program and the restoration of a westslope cutthroat stream. Public benefits include: 1) expanding suitable habitat conditions for westslope cutthroat trout, 2) improved habitat for brown trout and 3) improved water quality conditions (reduction in sediment and temperature).

- H. Will the project interfere with water or property rights of adjacent landowners? (explain):
-

Lincoln Spring Creek Restoration

No

- I. Will the project result in the development of commercial recreational use on the site?: (explain):

No

- J. Is this project associated with the reclamation of past mining activity?

No

Each approved project applicant must enter into a written agreement with Montana Fish, Wildlife & Parks specifying terms and duration of the project. The applicant must obtain all applicable permits prior to project construction. A competitive bid process must be followed when using State funds.

IV. AUTHORIZING STATEMENT

I (we) hereby declare that the information and all statements to this application are true, complete, and accurate to the best of my (our) knowledge and that the project or activity complies with rules of the Future Fisheries Improvement Program.

Applicant Signature:

Ryer Neudecker

Date:

11-28-2017

Sponsor (if applicable):

***Highlighted boxes will automatically expand.**

Mail To: Montana Fish, Wildlife & Parks
Fisheries Division
PO Box 200701
Helena, MT 59620-0701

E-mail To: Michelle McGree
mmcgree@mt.gov
(electronic submissions MUST be signed)

Incomplete or late applications will be rejected and returned to applicant.
Applications may be rejected if this form is modified.

*****Applications must be signed and *received* by the Future Fisheries Program Officer in Helena before December 1 and June 1 of each year to be considered for the subsequent funding period.*****

Lincoln Spring Creek Restoration



Photos 1-2: Existing over-widened condition on Lincoln Spring Creek; Fine sediment accumulation and embeddedness of substrate.

Lincoln Spring Creek Restoration

Both tables must be completed or the application will be returned

WORK ITEMS (ITEMIZE BY CATEGORY)	NUMBER OF UNITS	UNIT DESCRIPTION*	COST/UNIT	TOTAL COST	CONTRIBUTIONS			
					FUTURE FISHERIES REQUEST	IN-KIND SERVICES**	IN-KIND CASH	TOTAL
<u>Personnel***</u>								
Survey	30	hrs	\$100.00	\$ 3,000.00			3,000.00	\$ 3,000.00
Design	40	hrs	\$100.00	\$ 4,000.00			4,000.00	\$ 4,000.00
Permitting	40	hrs	\$40.00	\$ 1,600.00		1,600.00		\$ 1,600.00
Oversight	110	hrs	\$100.00	\$ 11,000.00			11,000.00	\$ 11,000.00
Oversight	100	hrs	\$40.00	\$ 4,000.00		4,000.00		\$ 4,000.00
			Sub-Total	\$ 23,600.00	\$ -	\$ 5,600.00	\$ 18,000.00	\$ 23,600.00
<u>Travel</u>								
Mileage	2000	miles	\$0.58	\$ 1,160.00		1,160.00		\$ 1,160.00
			Sub-Total	\$ 1,160.00	\$ -	\$ 1,160.00	\$ -	\$ 1,160.00
<u>Construction Materials****</u>								
Transplants	50	each	\$25.00	\$ 1,250.00		1,250.00		\$ 1,250.00
Willow cuttings	4000	each	\$0.50	\$ 2,000.00		2,000.00		\$ 2,000.00
Sod	50	CY	\$100.00	\$ 5,000.00		5,000.00		\$ 5,000.00
Wood	50	CY	\$100.00	\$ 5,000.00		5,000.00		\$ 5,000.00
				\$ -				\$ -
			Sub-Total	\$ 13,250.00	\$ -	\$ 13,250.00	\$ -	\$ 13,250.00
<u>Equipment and Labor</u>								
Hydraulic Excavator	300	hrs	\$125.00	\$ 37,500.00	8,000.00		29,500.00	\$ 37,500.00
Track Truck	121	hrs	\$100.00	\$ 12,100.00	2,000.00		10,100.00	\$ 12,100.00
Labor	40	hrs	\$45.00	\$ 1,800.00			1,800.00	\$ 1,800.00
			Sub-Total	\$ 51,400.00	\$ 10,000.00	\$ -	\$ 41,400.00	\$ 51,400.00
<u>Mobilization</u>								
All Equipment	1	Lump Sum	\$1,500.00	\$ 1,500.00			1,500.00	\$ 1,500.00
			Sub-Total	\$ 1,500.00	\$ -	\$ -	\$ 1,500.00	\$ 1,500.00
TOTALS				\$ 90,910.00	\$ 10,000.00	\$ 20,010.00	\$ 60,900.00	\$ 90,910.00

MATCHING CONTRIBUTIONS (do not include requested funds)

CONTRIBUTOR	IN-KIND SERVICE	IN-KIND CASH	TOTAL	Secured? (Y/N)
Landowner	\$ 11,250.00	\$ 28,400.00	\$ 39,650.00	YES
Montana Trout Unlimited	\$ -	\$ 5,000.00	\$ 5,000.00	YES
WestSlope Chapter of Trout Unlimited	\$ -	\$ 5,000.00	\$ 5,000.00	YES
US Fish & Wildlife Partners Program	\$ -	\$ 22,500.00	\$ 22,500.00	YES

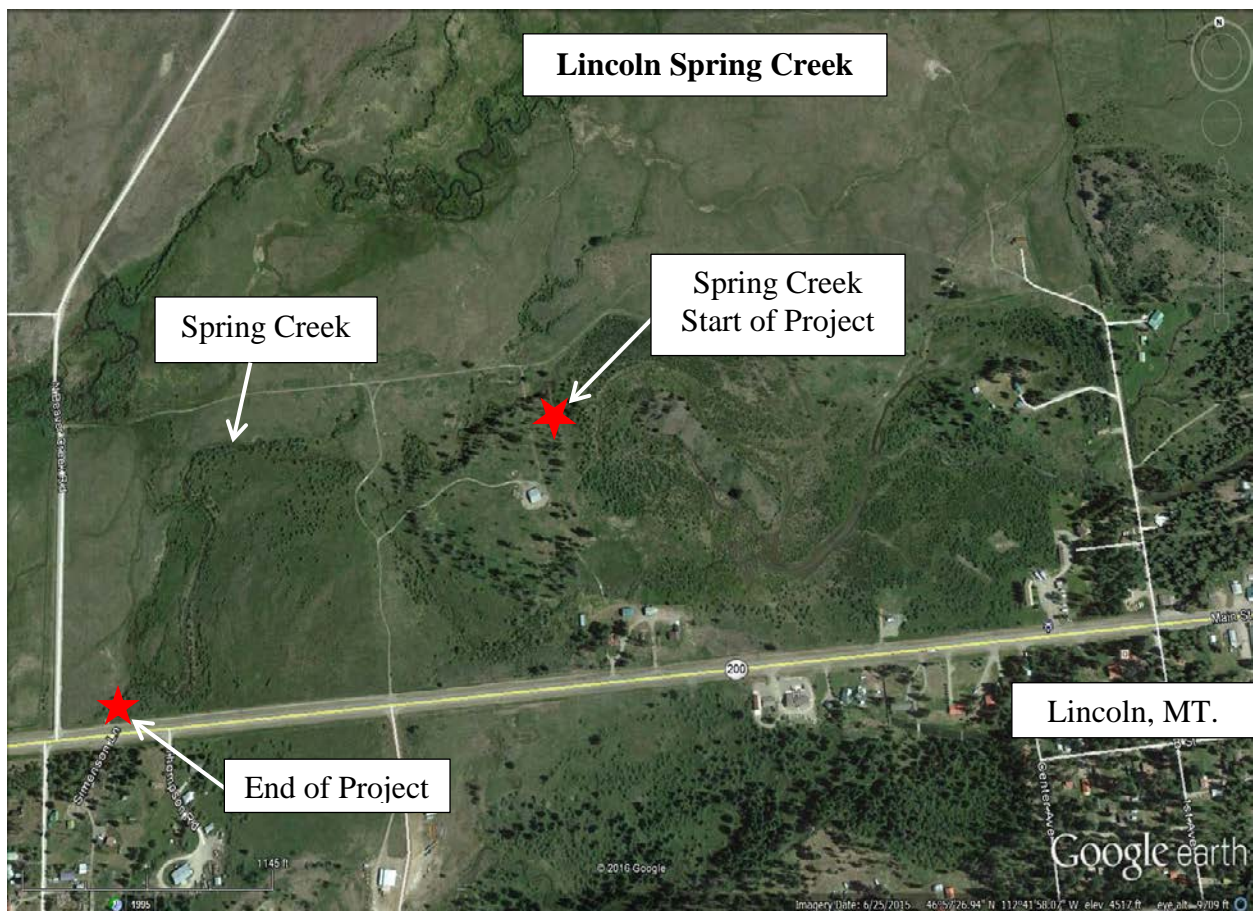
Lincoln Spring Creek Restoration

BBCTU	\$ 6,760.00	\$ 2,000.00	\$ 8,760.00	YES
TOTALS	\$ 18,010.00	\$ 62,900.00	\$ 80,910.00	

Lincoln Spring Creek Habitat Improvement Project

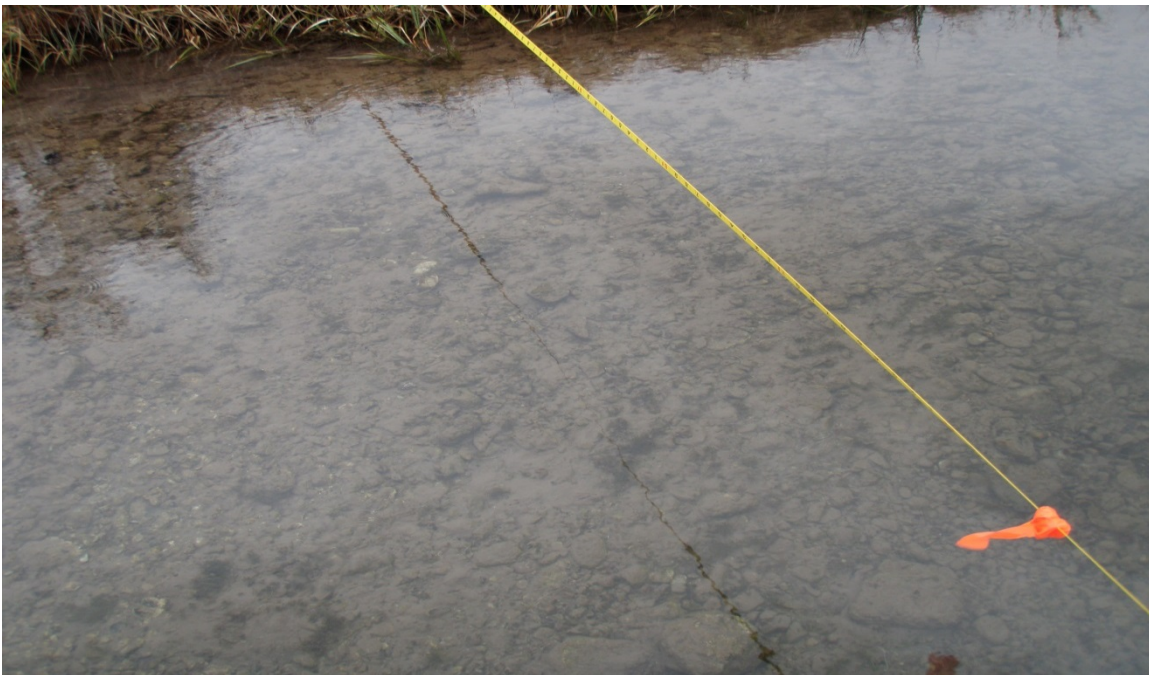
Project Location & Overview

Lincoln Spring Creek is a first-order spring creek tributary to Keep Cool Creek and flows five miles exclusively through private land. Based on landowner accounts and recent FWP data, the stream supported populations of bull trout historically, and currently westslope cutthroat trout, brown trout and brook trout are present. The Lincoln Spring Creek habitat improvement project is located approximately 1 mile west of Lincoln Montana and builds upon a stream restoration project implemented in 2008 where over 9,000 feet of channel was restored by narrowing and deepening overwidened reaches, increasing sinuosity, reconnecting floodplains and improving fish passage conditions. The goal of this project is to restore the instream, riparian and wetland functions of this spring creek for native fish rearing, spawning and overall habitat conditions. The proposed project will restore 4,400 feet of Lincoln Spring Creek and 0.47 acres of emergent wetlands. Project goals include increasing habitat diversity for fish, waterfowl, and other wildlife, restoring a natural spring creek ecosystem, re-establishing stream and floodplain connectivity, improving wetland structure and function, and increasing wetland area.



Existing Condition

Past land use activities such as channel straightening and historic grazing pressures have left many areas of the Lincoln Spring Creek channel with high width/depth ratios resulting in fine sediment deposition in the channel margins and has cemented and infilled channel substrates. These fine sediments limit macroinvertebrate production and salmonid spawning areas throughout the reach. Many sections of the project area lack woody riparian habitat that provide shading for the stream and cover for the fishery. Many segments of the stream have some riffle and run features but due to over widening, the riffle, run, pools and glides are not functioning based on the reference reaches. From section 1750 to the end of the project, the stream has been straightened and has down cut leaving the both the right and left banks higher than reference conditions. Most of the existing banks are stable and will be largely left alone however they lack woody riparian vegetation and the associated root systems that provide stability and habitat.



Photographs show fine sediment/silt filling Spring Creek substrate at Cross section 16+94. Substrate in Spring Creek provides little macroinvertebrate production habitat and has cemented in large portions of channel, eliminating potential salmonid spawning areas. Pebble count data for this cross section is located below.

Lincoln Spring Creek Restoration

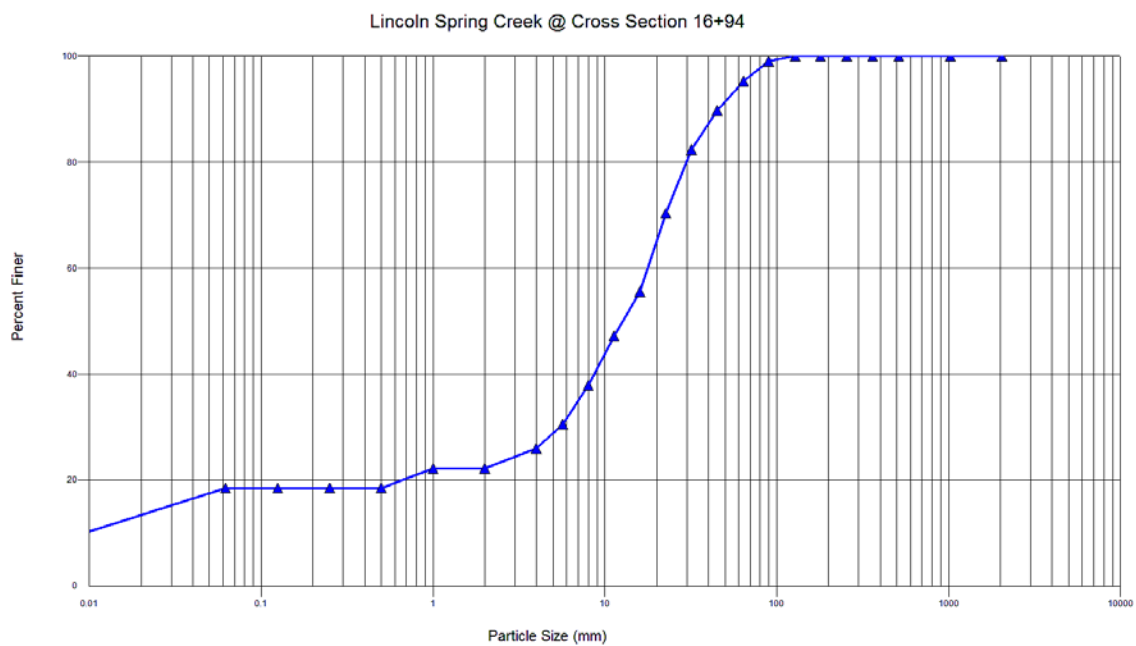


Figure 1 – Pebble count distribution of Lincoln Spring Creek. Substrate covered with fine silt, was noted during data collection

Below; existing Ford and area of livestock use over widened channel and destroyed bank and vegetation; a hardened ford will be installed at this location (~39+60) that will narrow the stream channel and allow livestock watering and access to both sides of the stream without impacting other areas of Spring Creek.



Proposed alignment station 32+00 to 40+50 is an area of past straightening that resulted in over 800 ft. of straightened, over-wide channel that has lost its proper pattern, profile and dimensions with very little fish habitat and cover; this section of stream has a muck bottom that ranges from a few inches to over 2 feet in depth. Refer to proposed channel alignment planview in Appendix A for proposed realignment.

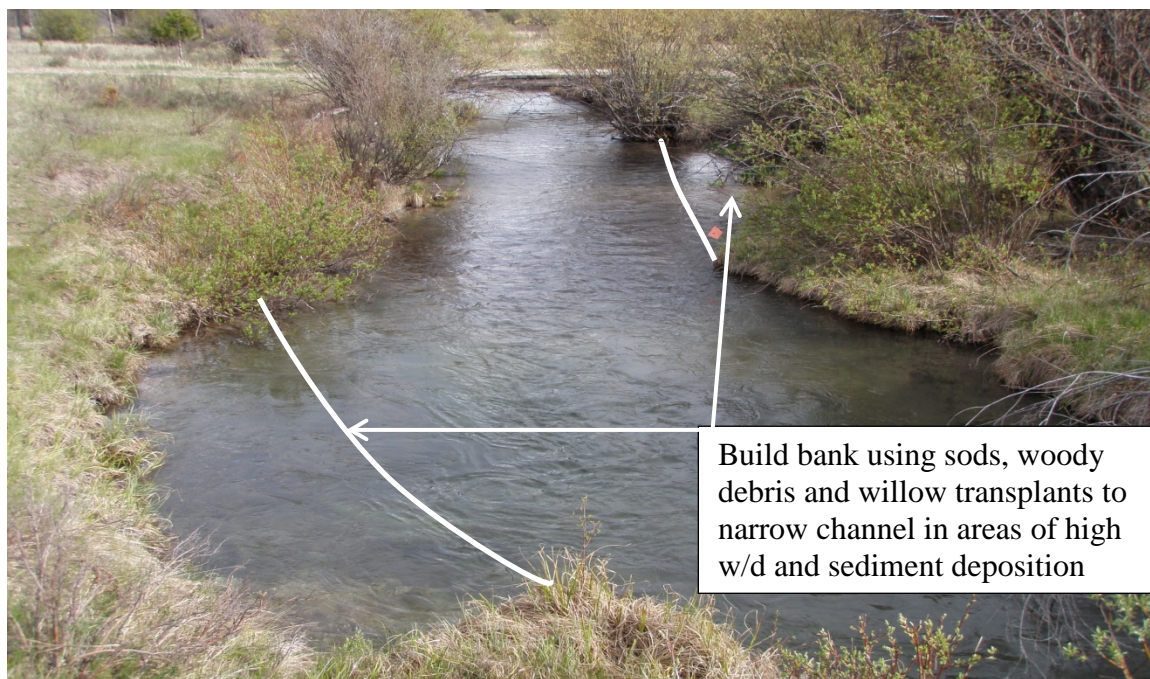
Project Objectives and Scope

Lincoln Spring Creek habitat improvement project will restore a natural spring creek ecosystem, re-establishing stream and floodplain connectivity, improve wetland structure and function, increase emergent wetlands and create and increase quality, diverse fishery habitat for all age-classes of salmonids and includes:

- Restoring proper pattern, profile and dimensions to those reaches that have been straightened and not functioning.
- Improving sediment transport conditions to help maintain cleaner substrate and provide better food production and increase spawning areas in Lincoln Spring Creek.
- Installation of small, root mimicry structures to provide refugia, overhead cover and stability until the native shrub component and channel function are restored.
- Narrow the over widened stream channel with finger bars to restore floodplain functions and emergent wetland values in the active floodplain.

Lincoln Spring Creek Restoration

The total length of the project area is 4,400 feet. Of that, approximately 1800 ft. of bank will be treated by incorporating root mimicry or small wood since the majority of stream bank is stable, but lacks root vegetation because of the lack of woody vegetation. Woody debris used for habitat and stabilization will be installed as close to the bank as possible, and still provide fishery refugia and overhead cover. Most of the proposed channel work will involve narrowing small areas of the existing channel with sods, willows and woody debris to bring channel dimensions to a reference condition. Photograph below shows an example of channel narrowing. Most areas of channel requiring this treatment are much smaller, usually animal crossings and divots in the existing channel margin.



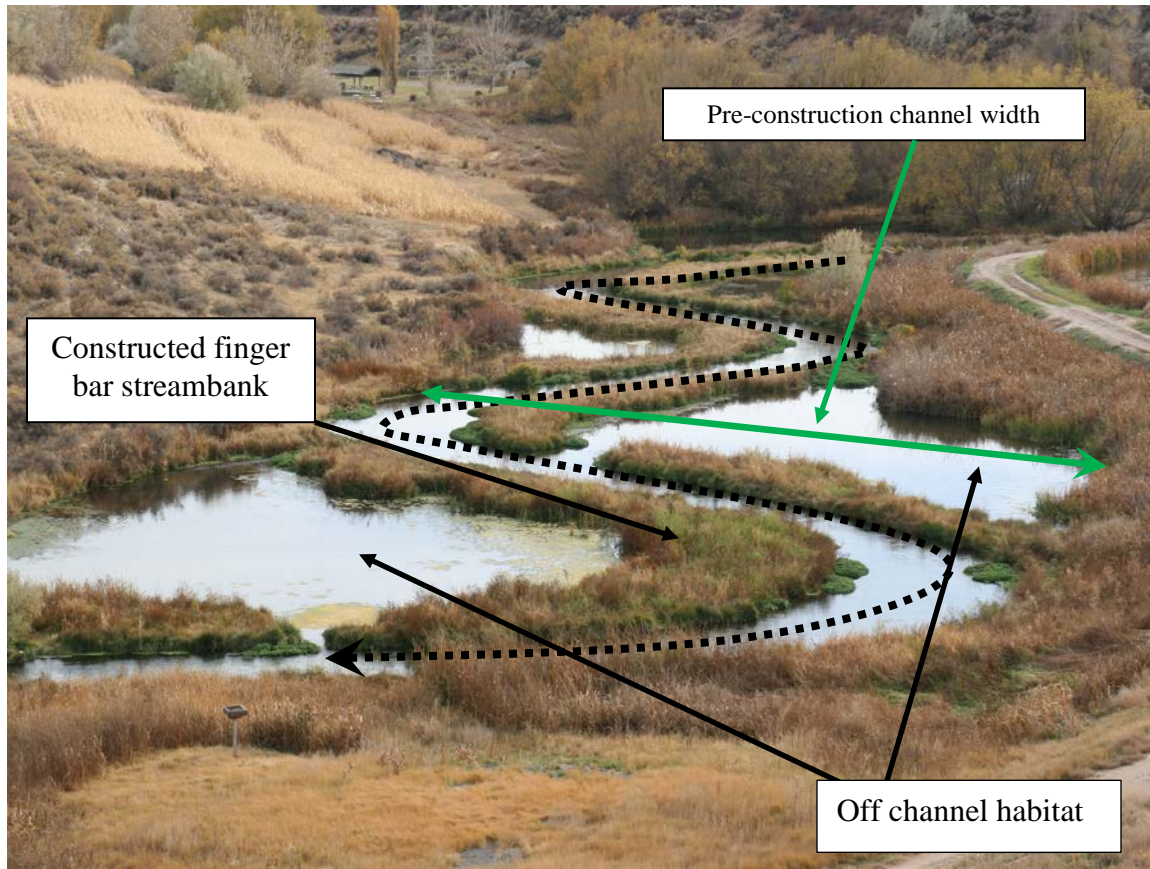
Lincoln Spring Creek Restoration

There is only one area of proposed re-alignment where the channel was historically straightened and past activities have resulted in aggradation of fine sediments. This reach of Lincoln Spring Creek (32+00 to 40+50 of planview in Appendix A) lacks typical instream channel features including run, riffle, pool, glide sequences. The photograph below shows the segment of Lincoln Spring Creek from approximately 32+50 to 35+50 that will be re-aligned.



No other sections require realignment, as channel geometry is currently functioning and any construction would not result in a significant improvement to channel geometry. The re-alignment will move parts of the channel centerline up to 50 feet from the existing channel location and utilize existing willows to provide shading and stability for the newly aligned channel. To restore the floodplain and its wetland features and to limit the amount of fill needed for bank construction, finger bars will be used to narrow the channel in areas where it has become over-widened. Finger bars will be constructed of a gravel/cobble and/or wood base and topped with sod to bankfull elevation. These structures will be connected to an inside meander bend bank at their upstream end. Photograph below shows an example of a finger bar on an over widened stream channel.

Lincoln Spring Creek Restoration



Narrowing the channel throughout the reach will result in 1-8 feet of existing channel being narrowed with sods, and woody material to build the bank to design specifications. Narrowing the existing channel and the proposed re-alignment will result in reduction of open water and an increase of emergent wetland acreage throughout the project area of approximately 0.47 acres. Floodplain finger bars will be set to a maximum of bank-full height to make sure they function as floodplain wetlands. The open water that remains in the backwater areas will function more as floodplain wetlands as there won't be running water over top of them. This should allow for emergent wetland vegetation to recolonize in these sites and provide for better wetland and floodplain functions. A planview showing finger bar and emergent wetlands in the realignment segment of Lincoln Spring Creek is located in the appendix.

Reference Data for Lincoln Spring Creek is limited to short stream sections within the reach that appear to be functioning at or near reference condition, i.e. clean substrate, stable banks, expected channel feature, riffle, run, pool, glide and functioning floodplains. Land use and channel manipulation, up and downstream of the project area has degraded Lincoln Spring Creek and has w/d ratios higher than the project area. Cross sectional data and numerous bankfull width and depth measurements in these areas were used to help confirm channel design dimensions. The cross section overlay shown here illustrates the extent of over widening in the re-alignment section of Spring Creek.

Lincoln Spring Creek Restoration

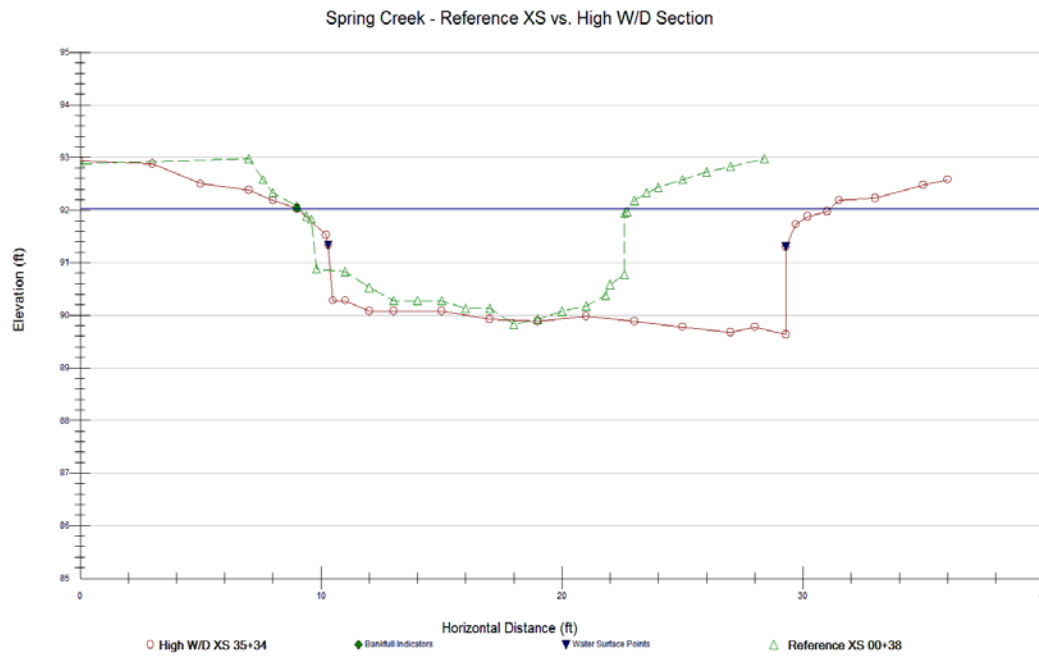


Figure 2 - Reference Cross Section was used to help validate channel dimensions.

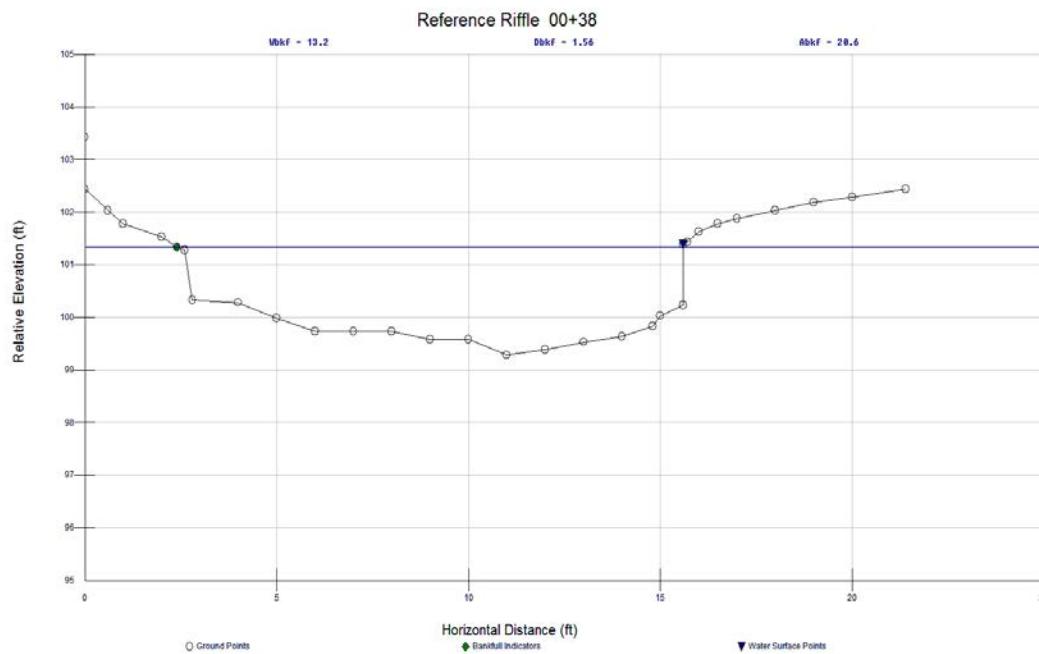


Figure 3 - Reference riffle

E-Stream Type Channel Dimensions Template

Stream: Spring Creek
Location: near Lincoln, MT
Drainage Area:

Bold Figures - Enter values for specific project

	GEOMORPHIC FEATURE					
	Riffle		Run		Pool	
	Feet	Dimensionless Coefficient	Feet	Dimensionless Coefficient	Feet	Dimensionless Coefficient
Area	25.0		26.3		28.8	
Width/Depth	8					
Range (Low)	6					
Range (High)	10					
Width						
Average	14.1		12.4	0.88	17.0	1.2
Range (Low)	12.2		11.4	0.81	15.6	1.1
Range (High)	15.8		13.5	0.95	18.4	1.3
Avg. Depth						
Average	1.8		2.1	1.20	1.5	0.83
Range (Low)	1.6	0.9	1.9	1.10	1.4	0.72
Range (High)	2.0	1.1	2.3	1.30	1.6	0.93
Max.Depth						
Average	2.2	1.3	2.3	1.30	3.5	2.00
Range (Low)	2.2	1.2	2.1	1.20	3.1	1.75
Range (High)	2.4	1.4	2.5	1.40	4.4	2.50
Max. Scour	2.5	1.4	2.7	1.50	4.9	2.75

Figure 4 –Lincoln Spring Creek Design dimensions.

Lincoln Spring Creek Restoration

Using design dimensions, the attached cross section overlays show the how much the area of Spring Creek in the re-alignment area is over widened.

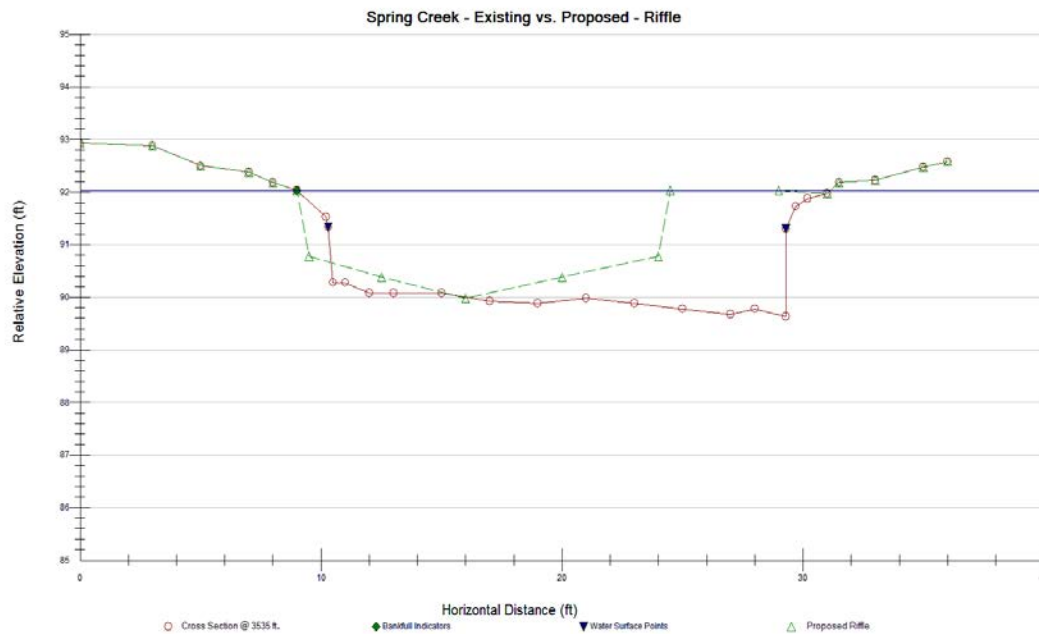


Figure 5,6 – Proposed channel cross section in high W/D areas of Lincoln Spring Creek.

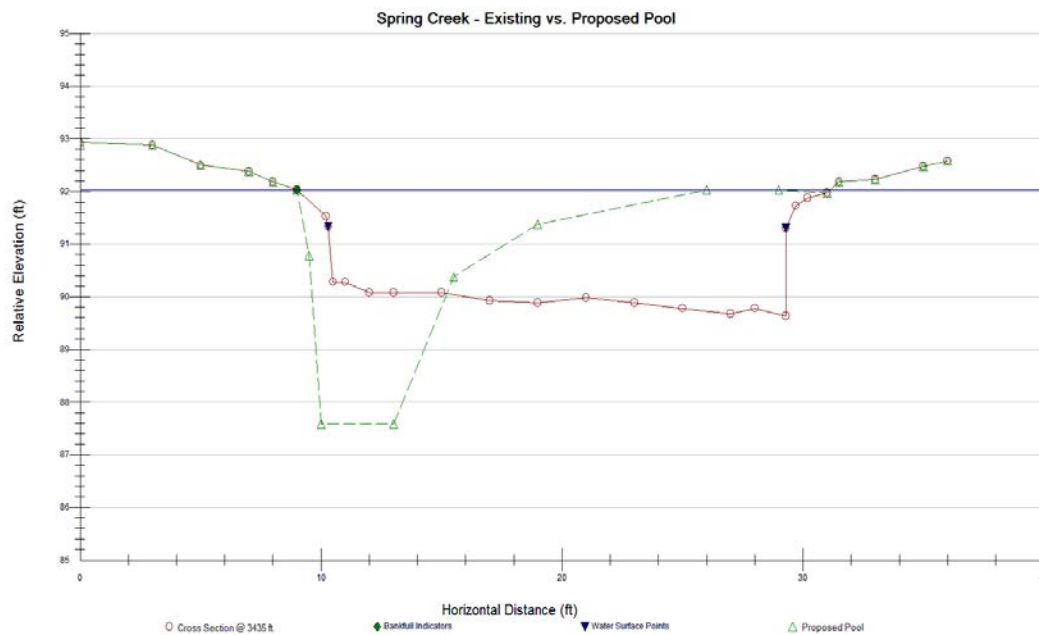


Figure 6

Materials used for the Spring Creek Habitat Improvement will include the following:

100-140 CY	Root mimicry (small diameter wood) will be used for stability, overhead cover and shade and bases for sodmats and shrub plantings
80-100 ea.	Live willow, aspen, cottonwood transplants for shade and overhead cover
100-140 CY	Sod mats of carex/juncus to narrow channel, construct banks

All material will be gathered on Snowberry Properties.

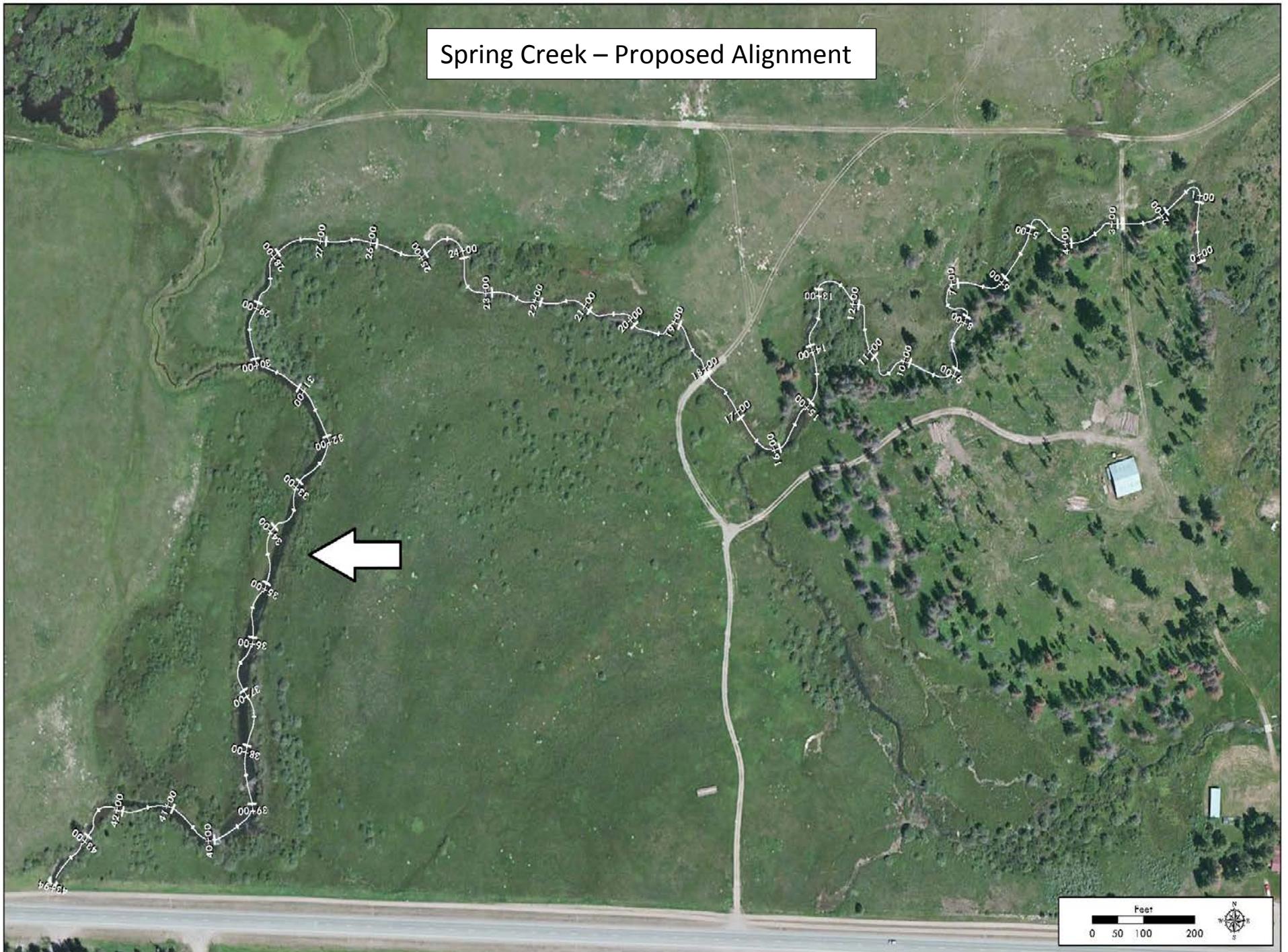
Equipment needed for this project will include an excavator with thumb that should be at least a 30,000 - 40,000 pound class excavator or equivalent. The excavator will be used for all phases of construction as well as for collecting trees for habitat construction, since it will be used near the channel it will be in new or near new condition to eliminate oil leaks. An additional mini excavator may be used to assist as needed and to construct channel in areas that the large machine cannot access easily. A skid steer or other loader may be used to shuttle materials to the excavator and assist with channel habitat installation. Loading the trees onto a trailer for transport may also be an option; the loader/skid steer will not be used in the stream channel. A six to ten yard dump truck may be used to haul materials to the project area; the truck will not be used in the stream channel. All equipment (and materials) will be staged and fueled on upland areas adjacent to Spring Creek. All machines used for this project will be cleaned prior to mobilization to Spring Creek to avoid introduction of noxious weeds.

Spring Creek Habitat Improvement Appendix A

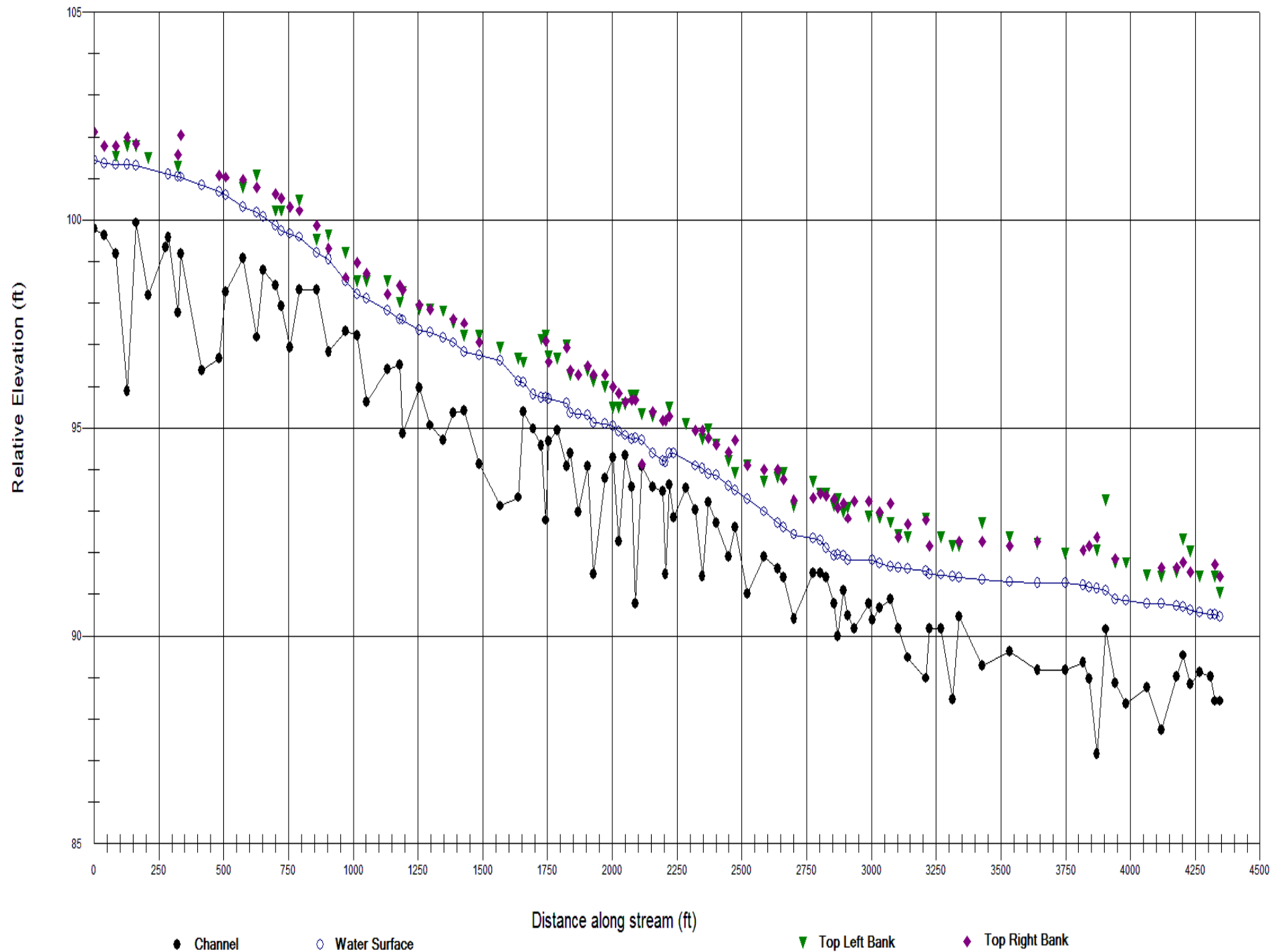
- Project Planview
- Longitudinal Profile – existing condition
- Proposed Root Mimicry Location Spreadsheet
- Proposed Channel Re-alignment and Finger bar/
Emergent Wetland locations 32+50 to 35+50

Lincoln Spring Creek Restoration

Spring Creek – Proposed Alignment



Spring Creek - Existing Longitudinal Profile

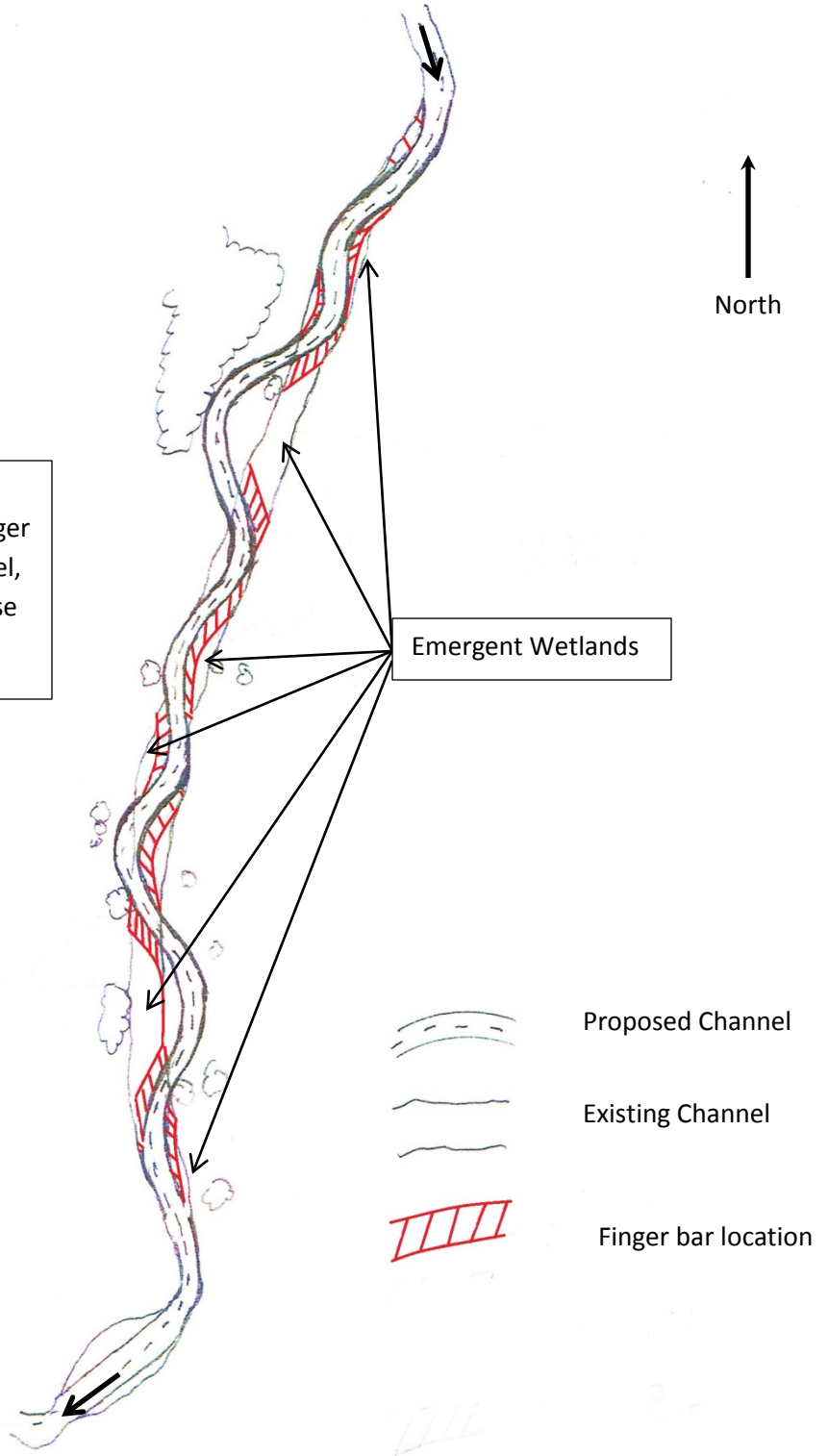


Lincoln Spring Creek Restoration		
Project Description		
Root Mimicry Locations		
station*	Feature	Proposed Action
0+00	Riffle	Start of Project
0+25-1+00	Riffle/Run	Shape TW, narrow back eddy to specification
1+25	Pool	**Narrow channel-build right bank, construct pointbar, add Root mimicry and woody debris for shading and cover
1+50 - 2+10	Riffle	Narrow Channel-shape TW
3+75 - 4+00	Pool	Shape compound pool
4+00	Pool	Add Root mimicry, shape pool
4+25	riffle	build left bank to narrow channel, add Root mimicry, shape TW
4+75	Pool	Willow transplants - stability and habitat- shape pool and pointbar
5+00 -6+00	Riffle	shape TW, Root mimicry
6+20	Pool	Shape Pool and pointbar, add Root mimicry in Bare Left bank
7+00 - 7+45	Pool	Shape TW, willow transplants, Root mimicry
7+00 - 8+00	varies	Root mimicry for shade and cover / transplants
8+50	Run	shape run, small pointbar on left bank to narrow channel
9+00	run/pool	Root mimicry for shade and cover / transplants
9+25-	riffle/run	Root mimicry for shade and cover
10+15	Run	Shape Run, Root mimicry
10+15-12+50	varies	Root mimicry for shade and cover / transplants
12+75	Pool	Root mimicry
13+00	Pool	Root mimicry
13+25 - 14+00	riffle	Narrow Channel-shape TW
14+00 - 15+00	varies	Narrow Channel-shape TW
15+00	run/pool	Root mimicry - shape channel
15+40	Pool	move TW to right bank, 1 or2 Root mimicry, Root mimicry, shape pool, finger bar for left bank
16+10	Pool	existing vane; reconstruct to restore function- Root mimicry
16+50	Riffle	confluence; construct point bar on north branch upstream to align channel
16+50 -17+40	Riffle	Willow transplants, Root mimicry/shade
17+50	Pool	Root mimicry/shade
17+70 -	riffle / run	Willow transplants, Root mimicry/shade
18+00	riffle	Bridge
18+70	Run	willow trans. Wood in bank, overhang cover
18+80	riffle	willow trans/habitat/shade
19+10	Pool	Root mimicry to fill existing backeddy
19+30	Pool	leave channel-clay control, Root mimicry
19+80 -20+30	riffle/run	Root mimicry
20+30	Pool	Root mimicry or brush trench, fill south channel with wood and sod
20+30-23+50	varies	minimal work: fill holes in banks, Root mimicry as needed
23+50	Pool	No work
23+80 - 24+30	riffle	Root mimicry/shade
24+50	Pool	RB- brush trench, bankfull bench, Root mimicry
24+75 -26+75	riffle/run	Root mimicry, widths mosly within spec.
26+75 - 28+25	riffle/run	Root mimicry
28+40	Pool	bankfull bench, brush trench / overhang cover
28+50 - 28+75	riffle	willow trans. Wood in bank, overhang cover, shape channel (reverse geometry)
28+75	Pool	Root mimicry/shade
28+75 - 30+20	run/riffle	willow transplants, Root mimicry/shade / fill holes in bank w/sod
30+30	Pool	Root mimicry/shade
30+50 - 32+20	riffle/run	Willow transplants, Root mimicry/shade
32+25	Pool	Root mimicry/ shade/ transplants / brush trench or Root mimicry
	Riffle	Root mimicry/ shade/ transplants
33+00	Pool	Root mimicry/ shade/ transplants
	riffle	Root mimicry/ shade/ transplants
33+50	pool	Root mimicry/ shade/ transplants
	riffle	Root mimicry/ shade/ transplants
34+10	pool	Root mimicry/ shade/ transplants / brush trench or Root mimicry
	riffle	Root mimicry/ shade/ transplants
34+75	pool	Root mimicry/ shade/ transplants / brush trench or Root mimicry
	riffle	Root mimicry/ shade/ transplants
35+30	pool	Root mimicry/ shade/ transplants / brush trench or Root mimicry
	riffle	Root mimicry/ shade/ transplants
35+80	Run	Root mimicry/ shade/ transplants / brush trench or Root mimicry
	riffle	Root mimicry/ shade/ transplants
36+50	pool	Root mimicry/ shade/ transplants
	riffle	Root mimicry/ shade/ transplants
37+10	pool	Root mimicry/ shade/ transplants / brush trench or Root mimicry
	riffle	Root mimicry/ shade/ transplants
38+00	run/pool	Root mimicry/ shade/ transplants
	run/riff	Root mimicry/ shade/ transplants
38+90	Pool	already to depth shape pt. bar add Root mimicry / transplants
39+25	Ford / Riffle	narrow channel / armor xing with small cobble, gravel
39+70	pool	Root mimicry
	run	Root mimicry/shade
40+50	pool	Willow transplants, Root mimicry/shade
40+75	riffle	Root mimicry/shade
41+50	pool	add wood
	riffle/run	
42+10	pool	Willow transplants, Root mimicry/shade
42+25	riffle/run	Willow transplants, Root mimicry/shade
* All proposed structure locations are approximate and will be field fit to match existing vegetation and channel features and conditions.		
** Root mimicry will be added throughout reach to provide shading and cover as needed		

Lincoln Spring Creek Habitat Improvement
Emergent Wetland / Finger bar Locations



Material excavated from new channel alignment will be used to construct finger bars, partially filling the existing channel, establishing emergent wetlands in those areas.



NOT TO SCALE